IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: John O. LAMPING et al.	Art Unit: 2628
Serial No.: 09/124,805	Confirmation No. 7115
Filed: July 29, 1998	Examiner: Jin Cheng WANG

For: **LOCAL RELATIVE LAYOUT OF NODE-LINK STRUCTURES IN SPACE WITH NEGATIVE CURVATURE**

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF RESPONSE

Enclosed are the following documents in response to the Notification of Non-Compliant Appeal Brief mailed July 10, 2007, for the above-identified application:

  [**X**]   Amended Appeal Brief;

  [**X**]   Petition for One Month Extension of Time.

[**X**]   Also enclosed are:

  [**X**]   Revocation and New Power by Assignee and Change of Correspondence Address;

  [**X**]   Statement Under 37 CFR §3.73(b) and copy of Assignment.   Applicants respectfully request that this Revocation and New Power by Assignee and the Change of Correspondence Address be accepted and made of record.

The fee has been calculated as follows:

	NO. OF CLAIMS		EXTRA CLAIMS	RATE	FEE
Total Claims	16	- 20 =		x $50.00	
Independent Claims	4	- 4 =		x $200.00	
If multiple dependent claims are presented, add $360.00					
Total Amendment Fee					
If small entity status is applicable, subtract 50% of Total Amendment Fee					
Other fees: **One Month Extension of Time**					$60.00
TOTAL FEE DUE					**$60.00**

[X]   Please charge $60.00 to Deposit Account No. 50-1283 for the total fee.
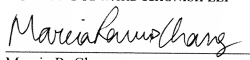
The Director is hereby authorized to charge any appropriate fees under 37 C.F.R. §§1.16, 1.17, and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 50-1283.

Dated: **September 10, 2007**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of: John O. LAMPING et al.	Art Unit: 2628
Serial No.: 09/124,805	Confirmation No. 7115
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AMENDED APPEAL BRIEF

Sir:

    This Amended Appeal Brief is filed in response to the Notification of Non-Compliant Appeal Brief mailed July 10, 2007.

    Also submitted herewith is a Request for Extension of Time, together with the appropriate fee.

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest is **Inxight Software, Inc.,** the assignee of record.

II. RELATED APPEALS AND INTERFERENCES

There are no known appeals or interferences relating to this case.

III. STATUS OF CLAIMS

Claims 1-28 were canceled.

Claims 29-44 are pending in this case and all have been rejected. All of the rejected claims are being appealed.

IV. STATUS OF AMENDMENTS

An amendment was filed on June 1, 2006, cancelling claims 1-28. The Amendment was approved for entry by the Examiner on July 18, 2006.

V.   SUMMARY OF CLAIMED SUBJECT MATTER

1.   Overview of the Invention

The invention pertains to ways of displaying very large node-link structures, such as hierarchical tree structures. Often these are very difficult to display satisfactorily, because as the number of levels in the tree increases, the amount of information to be displayed tends to increase exponentially. Very quickly, there is not enough space on a display screen to show it all.

The present invention provides an improvement in a solution to this problem described in the inventors' own earlier patent, Lamping U.S. Patent No. 5,619,632 ("Lamping '632").[1] In Lamping '632, roughly described, the node-link structure is displayed in what appears to be a hyperbolic plane, with the root node at the center of a disk and the branches extending outwardly from the root node toward the edges of the disk. For example, see Fig. 15 of Lamping '632, reproduced below.

A user can interactively click and drag the image around on the disk, and as elements of the structure are moved closer to an edge of the disk, they get smaller and smaller until they disappear altogether. Meanwhile, elements toward the opposite edge of the disk become larger and larger, making room for more detail and/or further child elements of the node-link structure to become visible. See, for example, Fig. 16 of Lamping '632, also reproduced below.

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[1] Lamping '632 has overlapping but not identical inventorship with the present application. In this paper and all others submitted in the context of the present application, Appellants may discuss teachings of the earlier Lamping patents. No statement made in these papers should be considered as commenting on the scope of any claims of the earlier Lamping patents.
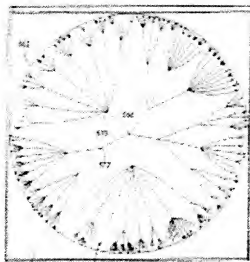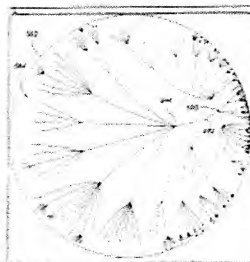
FIG. 15   FIG. 16

Other examples of this can be seen, for example, in the sequences of Figs. 20 and 21 of Lamping 632.

Thus by dragging the image around within the disk on the display, a user can increase or decrease the detail visible in desired parts of the node-link structure, thereby mitigating the problem of displaying large node-link structures in a limited amount of display space. The arrangement allows the user to see large portions of the node-link structure for context, and at the same time to focus in on the detail in any particular part of the structure as desired.

Working examples of node-link structures displayed in this manner can be found at any of the following web sites:

1. http://www.inxight.com/products/sdks/st/

2. http://nsdl.org/collection/ataglance/browseBySubject.html

3. http://www.flashkit.com/search/sitemap/index.shtml

The techniques in Lamping '632 make the node-link structures _appear on the display_ as if they were in a hyperbolic plane, but of course they are not. They are displayed on an ordinary computer monitor, which is flat.

Lamping '632 achieves this by a two-step process.

- First, the node-link structure is "laid out" in a "layout space", to obtain "layout data", indicating "positions" for parts of the node-link structure in the layout space.

- Second, the system uses the layout data to obtain "mapped data" for a representation of the node-link structure on a disk-shaped region on a flat display.

Lamping '632, col. 16, lines 53-62; Lamping '632, Fig. 8 steps 304-306, and corresponding text at col. 19, lines 7-10 (among other places).

The invention of the present application concerns improvements in the _first_ of these steps (laying out the node-link structure in a space with negative curvature), _not the second_ of these steps (mapping the element positions from the layout space to flat display space).

2.   Brief Explanation of Spaces with Negative Curvature

Because the Examiner seems not to understand the concept of a space with negative curvature, it is believed worthwhile to briefly explain it here. A space with negative curvature is a mathematical concept of a space having certain well-established properties, one of which is that parallel lines diverge, and another of which is that "through any position in a space with negative curvature that is not on a given straight line, there are multiple other straight lines parallel to the given straight line." Specification, p. 11, lines 3-6.

These are very commonly used definitions for such a space, used in numerous mathematics textbooks and publications in addition to Appellants' specification. See, for example, "Space Properties", pp. 1-6 (2002), available at http://scholar.uwinnipeg.ca/courses/ 38/4500.6-001/Cosmology/Properties_of_Space.pdf, visited 6/4/2004, p. 5 of 11, submitted with Appellants' Response on July 13, 2004 and attached as an Exhibit hereto:

> "In Euclid's geometry all surfaces are flat and parallel lines always stay the same distance apart, never meeting and never diverging. However, in curved non-Euclidean geometries, lines that start off parallel eventually cross each other in the positive curvature case, while these same lines diverge from each other in the negative curvature case."

See also Anderson, "Hyperbolic Geometry", p. 7, submitted with the IDS on April 6, 2005 and attached as an Exhibit hereto:

> "Hyperbolic geometry is then defined by using the same set of axioms as Euclidean geometry, with the hyperbolic variant of the Parallel Postulate, namely that given a hyperbolic line L and a point P not on L, there are at least two hyperbolic lines through P and parallel to L.".

Various other textbooks might define the term by referring to other properties of a space with negative curvature, but those definitions can be derived mathematically from the ones set out herein, and vice-versa. That is, they all define a space having all the same properties.

To visualize a space with negative curvature, one may consider the following three drawings:

Euclidean   Elliptic   Hyperbolic
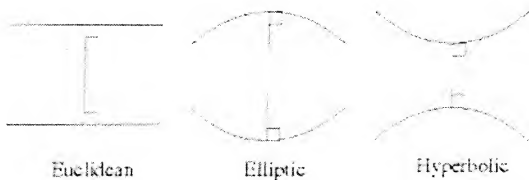
In the normal, Euclidean (flat) space, with which we are all familiar, if two lines are parallel to each other because they both intersect a common vertical line at right angles, then the two lines always remain at the same distance apart. In Non-Euclidean spaces, on the other hand, the two always lines can either diverge or converge. In a space with positive curvature, such as an elliptic space, the two parallel lines converge. In a space with negative curvature, such as a hyperbolic space, the two parallel lines diverge.

Another way to visualize the concept is to think of how the plane, on which the above lines are drawn, needs to be curved in order for the lines to seem straight. The following drawing, from the "Properties of Space" article cited above, illustrates this:
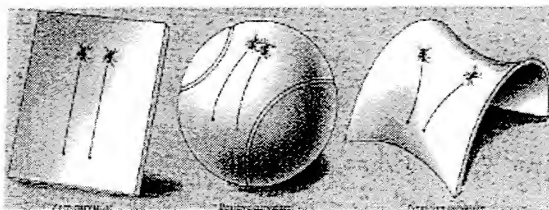
On a flat plane, a plane with zero curvature, if two ants start out traveling on two parallel lines, they will remain the same distance apart as long as they keep walking straight. But in a space with positive curvature (pictured in the middle), as the two ants continue to walk on what seems to them to be completely straight lines, they will in fact converge toward each other and eventually intersect. Similarly, in a space with negative curvature (pictured on the right), as the two ants continue to walk on what seems to them to be completely straight lines, they will in fact diverge away from each other. The lines diverge not because the lines are curved, but because the surface on which they are drawn is curved.

In Lamping '632, it is the layout space with negative curvature (where parallel lines diverge), together with the mapping functions for projecting the positions of elements in the layout space onto the flat display space, which is so effective at showing the user a large node-link structure in such a way that allows the user to see large portions of the structure for context, but to focus in on particular desired portions where more detail is desired.

3.   <u>Deficiencies in the Prior Art</u>

In the Lamping '632 methods, dragging the structure around on the display does not require a re-layout of the structure in layout space. The only thing that changes is the mapping of the positions in layout space to flat display space. But if a *structure* changes after it is displayed, for example if the user inserts or deletes an element, then a new layout into the layout space with negative curvature must typically be done for at least a large part of the structure as changed. Then the new mapping is performed from the new positions in layout space into the flat display space and redisplayed.

Performing layout on a large structure can be slow, and when taken together with redisplay, may prevent a user from effectively interacting with the changed structure. And

unfortunately, many of the layout techniques described in Lamping '632 have certain characteristics that mandate layout of at least a large part of the structure. These layout techniques make decisions at each node that depend on layout decisions higher in the tree and at its sibling nodes; as a result, adding or deleting a child of a node mandates that the layout be redone for all descendants of the node and of any of its siblings.

Also, the layout techniques in Lamping '632 save only the node's absolute position in the hyperbolic plane; any change in the structure that would change a node's position requires repeating the layout of its siblings and all of its descendants. (Specification, page 3, line 7, through page 4, line 2.)

4.   The Invention of the Present Application

Embodiments of the invention in the present patent application alleviate these problems and others by using a new technique for laying out elements of the node-link structure in the layout space with negative curvature. In particular, the new technique uses "nearby relationship data" (e.g. data from the node-link structure that describes the number of children that a parent node has, and/or the number of grandchildren that the parent node has) to derive "layout data" indicating what the element's position should be in the layout space. And the position of the element in layout space is not determined in absolute terms; it is determined and stored only in *relative* terms, *relative* to whatever position the parent has in layout space. (Specification, p.4).

For example, when an element, say a subject node, is to be laid out in layout space, it is first determined from the node-link structure how many other child nodes there are of the same parent node, and potentially also how many grandchild nodes there are of the same parent node. This "nearby relationship data" determines how much horizontal space to allocate for all the grandchild nodes in the layout space, how long the radial links will have to be in order to provide

such horizontal space, what angles to provide between the radial links, and ultimately where the subject node will have to be positioned in the layout space in order to satisfy the positioning scheme. (Specification, pp. 4-5).

And the position is thus determined only in *relative* terms in the layout space, for example a distance ("position displacement data") in the layout space from its parent node and an angle in the layout space from its parent node ("angle displacement data", for example indicating an angular difference between an incoming link to the parent and the outgoing link from the parent to the subject element). (Specification, pp. 4-5). The position of the subject node is stored in layout space only in these terms (Specification, p. 5, lines 16-17); the absolute x.y position of the node in layout space does not need to be calculated and does not need to be stored. (Specification, p. 14, line 1, to p. 15, line 10 and Figs. 1 and 2).

Again, once the element positions are established in layout space, they are mapped to flat display space in accordance with the user's selection of what portion of the structure to display with greater detail. The mapping step can be similar to that described in earlier Lamping patents. (e.g., Specification, p. 22, lines 1-11, and boxes 314, 326 and 336 in Fig. 3).

The above techniques mean that when the node-link structure itself changes, only the local region around the change needs to be re-laid out in layout space. That is, it is no longer necessary to traverse the entire node-link structure, from the root node outward, in order to make the necessary changes in the layout space. Nor is it necessary to change any information about the location of child and further descendant elements, since positions in the layout space with negative curvature are stored only relative to their parents. Thus the implied absolute position in layout space of the subject element and all its descendants can be changed merely by making a

small number of localized changes in the data structure. (Specification, page 4, line 3, through page 7, line 4.)

5.   Concise Explanation of the Subject Matter Defined in Each Independent Claim (37
C.F.R. 41.37(c)(1)(v)

As mentioned in the Summary of Claimed Subject Matter above, the claims cover methods for *local relative* layout of a node-link structure in a space with negative curvature. Representative independent claim 29 focuses primarily on the *relativeness* of the positions stored for the elements in the layout space.

Independent Claim 29 defines a method of laying out a node-link structure in a space with negative curvature. The claim calls initially for a step of obtaining "nearby relationship data" for an element in a plurality of elements of a node-link structure. (Fig. 2, box 100.) The nearby relationship data is typically limited to relationships with elements only a short distance in the tree structure from the subject element in the node-link structure (see specification examples at p.5, lines 4-5; p.10, lines 1-7; p.13, lines 18-21; p.14, lines 1-8; p.32, lines 9-11; p.34, lines 4-7 and p.46, line 21 - p.47, line 5.)

Claim 29 then calls for a step of calculating the element's position in the space of negative curvature (Fig. 2, box 102.) The element's position has to be based on the nearby relationship data (i.e. the nearby relationship data obtained in the step of obtaining.) (Fig. 3, box 160.)

Independent Claim 29 also states that after positions in the space with negative curvature for all elements in the plurality have been calculated, the positions in the space with negative curvature of each element in the plurality are to be stored only relative to an element of the node-link structure other than a root element of the node-link structure. (Fig. 2, box 102; p.4, lines 7-

9: p.5, lines 16-17; p.11, line 16 - p.12, line 2; p.14, lines 9-18; p.32, lines 12-14; p.34, lines 7-9, and especially p.37. lines 10-20.)

Independent Claim 42 defines a system having a processor for laying out a node-link structure in a space with negative curvature. The claim calls initially for the processor to obtain "nearby relationship data" for an element in a plurality of elements of a node-link structure. (Fig. 2, box 100, Fig. 3, p. 13, lines 5-10, p. 15, line 11 to p. 17, line 9.) The nearby relationship data is typically limited to relationships with elements only a short distance in the tree structure from the subject element in the node-link structure (see specification examples at p.5, lines 4-5; p.10, lines 1-7; p.13, lines 18-21; p.14, lines 1-8; p.32, lines 9-11; p.34, lines 4-7 and p.46, line 21 - p.47, line 5.)

Claim 42 then calls for the processor to calculate the element's position in the space of negative curvature (Fig. 2, box 102.) The element's position has to be based on the nearby relationship data (i.e. the nearby relationship data obtained in the step of obtaining.) (Fig. 3, box 160.)

Independent Claim 42 also states that after positions in the space with negative curvature for all elements in the plurality have been calculated, the positions in the space with negative curvature of each element in the plurality are to be stored only relative to an element of the node-link structure other than a root element of the node-link structure. (Fig. 2, box 102; p.4, lines 7-9: p.5, lines 16-17; p.11, line 16 - p.12, line 2; p.14, lines 9-18; p.32, lines 12-14; p.34, lines 7-9, and especially p.37. lines 10-20.)

Independent Claim 43 defines an article of manufacture for use in a system having a process for laying out a node-link structure in a space with negative curvature. The claim calls initially for the processor to obtain "nearby relationship data" for an element in a plurality of

elements of a node-link structure. (Fig. 2, box 100, Fig. 3, p. 13, lines 5-10, p. 15, line 11 to p. 17, line 9.) The nearby relationship data is typically limited to relationships with elements only a short distance in the tree structure from the subject element in the node-link structure (see specification examples at p.5, lines 4-5; p.10, lines 1-7; p.13, lines 18-21; p.14, lines 1-8; p.32, lines 9-11; p.34, lines 4-7 and p.46, line 21 - p.47, line 5.)

Claim 43 then calls for the processor to calculate the element's position in the space of negative curvature (Fig. 2, box 102.) The element's position has to be based on the nearby relationship data (i.e. the nearby relationship data obtained in the step of obtaining.) (Fig. 3, box 160.)

Independent Claim 43 also states that after positions in the space with negative curvature for all elements in the plurality have been calculated, the positions in the space with negative curvature of each element in the plurality are to be stored only relative to an element of the node-link structure other than a root element of the node-link structure. (Fig. 2, box 102; p.4, lines 7-9; p.5, lines 16-17; p.11, line 16 - p.12, line 2; p.14, lines 9-18; p.32, lines 12-14; p.34, lines 7-9, and especially p.37. lines 10-20.)

Independent Claim 44 defines a method of transferring instruction data from a processor in a second machine to a memory in a first machine (p. 17, lines 1-9.) The processor, in executing the instruction data, initially obtains "nearby relationship data" for an element in a plurality of elements of a node-link structure. (Fig. 2, box 100, Fig. 3, p. 13, lines 5-10, p. 15, line 11 to p. 17, line 9.) The nearby relationship data is typically limited to relationships with elements only a short distance in the tree structure from the subject element in the node-link structure (see specification examples at p.5, lines 4-5; p.10, lines 1-7; p.13, lines 18-21; p.14, lines 1-8; p.32, lines 9-11; p.34, lines 4-7 and p.46, line 21 - p.47, line 5.)

Claim 44 then calls for the processor to calculate the element's position in the space of negative curvature (Fig. 2, box 102.) The element's position has to be based on the nearby relationship data (i.e. the nearby relationship data obtained in the step of obtaining.) (Fig. 3, box 160.)

Independent Claim 44 also states that after positions in the space with negative curvature for all elements in the plurality have been calculated, the positions in the space with negative curvature of each element in the plurality are to be stored only relative to an element of the node-link structure other than a root element of the node-link structure. (Fig. 2, box 102; p.4, lines 7-9: p.5, lines 16-17; p.11, line 16 - p.12, line 2; p.14, lines 9-18; p.32, lines 12-14; p.34, lines 7-9, and especially p.37. lines 10-20.)

VI.   GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

All pending claims 29-44 stand rejected under 35 U.S.C § 102(b) over Lamping U.S. Patent No. 5,619,632.

VII. ARGUMENT

As mentioned in the Summary of Claimed Subject Matter above, the claims cover methods for *local relative* layout of a node-link structure in a space with negative curvature. Representative independent claim 29 focuses primarily on the *relativeness* of the positions stored for the elements in the layout space.

But whereas the claims cover methods for *laying out* the elements *into* a layout space with negative curvature, the Examiner's rejections of these claims all rely on methods taught in the Lamping '632 patent for *mapping* elements already positioned in the layout space with negative curvature, into the display space, which is *flat*. Not only do those techniques fail to anticipate Appellants claims because they do not obtain or calculate layout data "identifying the subject element's position in [a] space with negative curvature", but they also fail to satisfy other limitations in anticipate Appellants' claims, including the obtaining of layout data based only on "nearby relationship data", and not on the position of any other element in the structure.

1.   **Independent Claim 29, as Representative of Independent Claims 29 and 42-44 and Dependent Claims 30 and 37-41**

As mentioned, representative independent claim 29 focuses in primarily on the *relativeness* of the positions stored for the elements in the layout space. Claim 29 calls for:

29. A method of laying out a plurality of elements a node-link structure in a

space with negative curvature, the method comprising:

obtaining nearby relationship data for <u>each</u> element in the plurality, the nearby relationship data indicating information about nearby node-link relationships;

based on the nearby relationship data for each element in the plurality, calculating element's position in the space with negative curvature; and

storing the positions for each element in the plurality in a data structure such that after the positions for <u>all</u> elements in the plurality have been calculated, the position of <u>each</u> element in the plurality is stored in the data structure <u>only relative to an element</u> of the node-link structure <u>other than a root</u> element of the node-link structure. (emphasis added).

Thus claim 29, at a minimum calls for a step of calculating an elements position in a <u>space with negative curvature</u>.

The Examiner rejected claim 29 initially in the January 13, 2004 Office Action, at p. 4, line 18 - p. 5 line 10, citing Lamping '632, col. 23. line 56 to col. 24, line 65; col. 16, lines 25-62; and Figs. 13-21. This citation was repeated in each subsequent Office Action.

Appellants respectfully submit that these parts of Lamping '632 have to do with a method for mapping from *layout* space to a circular *display* region, which is <u>flat</u>, and is <u>not a space with negative curvature</u>.

Specifically, the Examiner cites Lamping's Fig. 13 and the description at col. 23, line 56 - col. 24, line 65. But Fig. 13 begins *after* the step in which the transformation is made from node-link data to layout data (i.e., *after* step 304 of Lamping's Fig. 8). See the very beginning of Fig. 13: "FROM BOX 304, ..."

In Fig. 13, the procedure described has to do with mapping from the layout data to the *flat unit disk* for eventual display. See step 500 at the beginning of Fig. 13: "Receive call for

mapping handle of root node." See also the beginning of the description at col. 23, lines 38-40: "Fig. 13 shows acts in *using* layout data *from* box 304 in Fig. 8 to present a representation of a node-link structure, as in boxes 306, 326, and 336 in Fig. 8." Boxes 306, 326, and 336 in Fig. 8 are all steps for *mapping* and *presenting* representations of the structure on a display or printout.

Thus, the Examiner has cited nothing in Lamping '632 that teaches *anything* about calculating positions in a space with negative curvature, only excerpts about obtaining *mapped* positions on the unit disk, which is *flat,* not a space with negative curvature.

In a telephone interview on July 2, 2003, Appellants thought that the Examiner had changed her position and was then of the view that the *layout* step of Lamping '632, and more specifically Lamping '250 as incorporated into Lamping '632, taught Appellants' previously claimed step of obtaining layout data indicating an element's position relative to a parent in the space with negative curvature. In their next Response; Response D filed October 21, 2003, therefore, at pp. 15-19, Appellants provided a detailed analysis of the layout method taught in Lamping '250 and Lamping '632 and showed why that method would not satisfy the limitations of Appellants' claim 29. The Examiner appears not have repeated this argument in the subsequent Office Actions, but should it be repeated in the Examiner's Answer, the Board is respectfully referred to the above section of Appellants' Response D.

Accordingly, Appellants respectfully submit that the Examiner has yet to make a *prima facie* case of unpatentability of claim 29.

2.   **Dependent Claims 31-36**

Claims 31-36 all depend ultimately from independent claim 29. These claims should all be allowable because of their dependency from independent claim 29. These claims also each add their own limitations which, it is submitted, render them patentable in their own right.

      a.   **Claim 31** adds a limitation that the position of each particular element as represented in the data structure after the positions for all elements in the plurality have been calculated, include:

> <u>position displacement data</u> indicating a distance between the particular element and a parent of the particular element,

and

> <u>angle displacement data</u> indicating an <u>angular difference</u> between an incoming link to the parent of the particular element and an outgoing link from the parent to the particular element. (emphasis added)

    Nowhere does Lamping '632 teach such features. At a minimum, the position in Lamping '632 specifies *angle* information only relative to a predetermined and fixed "zero direction". Lamping '250, col. 23, lines 64-65, referenced in Lamping '632. He certainly neither teaches nor suggests representing layout data using "angle displacement data indicating an angular difference between an incoming link to the parent of the particular element and an outgoing link from the parent to the particular element" as called for in Appellants' claim 31. The angles of incoming and outgoing links for parent nodes in layout space are not even mentioned in Lamping, '632.

    In the outstanding office action, the Examiner cites Lamping col. 23-24 and Fig. 13 as disclosing "the radii and angles for the set of children to obtain a position displacement and an angle displacement between the parent and the element." (October 6, 2004 Office Action, p. 10, lines 3-5.) But again, the cited text of Lamping concerns node positions in the flat display space, not in the space with negative curvature as required by parent claim 29.

      b.   **Claim 32** depends from claim 31 and adds the further limitation that the position as represented in the data structure include *only* the position displacement data and the angle displacement data. Again, Lamping '632 does not teach this limitation.

In the outstanding office action, the Examiner again cites Lamping col. 23-24 and Fig. 13 as teaching this limitation. (October 6, 2004 Office Action, p. 10, lines 3-5.) But again, the cited text of Lamping concerns node positions in the flat display space, not in the space with negative curvature as required by parent claim 29.

      c.   **Claim 33** calls for the step of obtaining nearby relationship data to include a step of obtaining a count of grandchildren for each of a set of children of the parent. Nothing in Lamping '632 teaches this feature. Nor does the Examiner make any attempt to identify it, except to point to col. 25, lines 24-50 and Fig. 13 (October 6, 2004 Office Action, p. 10, lines 6-8), which again concerns node positions in the flat display space, not in the space with negative curvature as required by parent claim 29.

      d.   **Claim 34** depends from claim 33 and adds limitations that the counts of grandchildren be used to obtain radii and angles, and that position displacement and angle displacement between the parent and the element be obtained using the radii and angles. Again, Lamping, '632 neither teaches nor suggests this feature. Nor does the Examiner in the office action make any attempt to identify it, except to point again to Lamping, col. 25, lines 24-50 and Fig. 13 (October 6, 2004 Office Action, p. 10, lines 6-8), which again concerns node positions in the flat display space, not the space with negative curvature as required by parent claim 29.

      e.   **Claim 35** depends from claim 34 and adds a limitation calling for a comparison to be made between the obtained angle displacement and the previous angle displacement to determine whether to lay out children of the element. Again, Lamping '632 nowhere teaches this element, and the part of Lamping '632 cited by the Examiner (col. 23 and 24; Fig. 13, cited in October 6, 2004 Office Action, p. 10, lines 3-5) is not a method of laying out a node-link structure in a space with negative curvature.

     f.   **Claim 36** depends from claim 30 and adds a limitation calling for the nearby node-link relationships, based on which the element's position relative to a parent in the space with negative curvature is to be obtained, include only relationships among the parent and the parent's children and grandchildren. The nearby node-link relationships therefore do not include any ancestors of the element's parent element. Not only is this feature not taught in Lamping '632, but it is contrary to Lamping '632, in which the node-link structure is taught as being laid out beginning at the root node. Nor do the parts of Lamping '632 identified by the Examiner (col. 25, lines 24-50; Fig. 13, cited in October 6, 2004 Office Action, p. 10, lines 6-8) teach the claimed features.

     Accordingly, it is respectfully submitted that each of the dependent claims 31-36 should be patentable since the Examiner has not made a prima facie case of unpatentability.

3.   **Conclusion of Argument**

     Appellants first invented a novel and effective way of helping users to visualize very large node-link structures, and patented their methods in the Lamping '632 and Lamping, '250 patents, among others. Roughly described, the methods involve a two-step process: laying out the node-link structure in a layout space with negative curvature, and then mapping the elements from layout space to a flat space for displaying on the surface of a flat monitor.

     They later saw a problem with the initial implementation of their method, and discovered a substantial improvement in the first of these two steps, the layout step, that could be made in order to overcome it. They filed the present patent application to claim the new improvement.

     The Examiner, however, is refusing to allow Appellants' claims because of an erroneous belief that the improvement is not only obvious from, but anticipated by, the inventors' own earlier Lamping '632 patent.

And for evidence the Examiner cites sections of Lamping '632 that describe the *second* step of Appellants' method, the *mapping* step, refusing to acknowledge that the claims call specifically for a method to take place in the *first* step of the method, the *layout* step. The claims, do not require the mapping step of Lamping '632 to follow, but they do call unambiguously for determining the position of an element of the node-link structure in a space with negative curvature, which the mapping step of Lamping '632 does not do.

Anticipation requires that <u>every</u> element of the claim be taught in a single cited reference. The Examiner has so far inexplicably failed to do this.

VIII. CONCLUSION

In view of the foregoing, Appellants ask that this honorable Board reverse the Examiner's rejections of the claims. In addition, it is submitted that all claims that are the subject of this examination are now allowable, and a notice of intent to issue a patent is respectfully requested.

The Commissioner is hereby authorized to charge any fee determined to be due in connection with this communication, or credit any overpayment, to our Deposit Account No. 05-1283.

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IX.   CLAIMS APPENDIX

1-28.   (Canceled)

29.   (Previously Presented) A method of laying out a plurality of elements of a node-link structure in a space with negative curvature, the method comprising:

obtaining nearby relationship data for each element in the plurality, the nearby relationship data indicating information about nearby node-link relationships;

based on the nearby relationship data for each element in the plurality, calculating element's position in the space with negative curvature; and

storing the positions for each element in the plurality in a data structure such that after the positions for all elements in the plurality have been calculated, the position of each element in the plurality is stored in the data structure only relative to an element of the node-link structure other than a root element of the node-link structure.

30.   (Previously Presented) A method according to claim 29, wherein said step of storing comprises the step of storing the positions for each element in the plurality in a data structure such that after the positions for all elements in the plurality have been calculated, the position of each element in the plurality is stored in the data structure only relative to a parent of the element.

31.   (Previously Presented) A method as in claim 30, in which the elements in the plurality of elements are nodes, and in which the parents are nodes, and in which the position of each particular element in the plurality as represented in the data structure after the positions for all elements in the plurality have been calculated, includes position displacement data indicating a distance between the particular element and a parent of the particular element, and angle displacement data indicating an angular difference between an incoming link to the parent of the particular element and an outgoing link from the parent to the particular element.

32.   (Previously Presented) A method as in claim 31, in which the position of each particular element in the plurality as represented in the data structure after the positions for all elements in the plurality have been calculated, includes only the position displacement data and the angle displacement data.

33.   (Previously Presented) A method as in claim 30, in which the step of obtaining the nearby relationship data comprises, for a particular one of the elements in the plurality:

for each of a set of children of the parent of the particular element, obtaining a count of grandchildren, the particular element being one of the set of children.

34.   (Previously Presented) A method as in claim 33, in which the step of obtaining layout data comprises, for the particular element

using the counts of grandchildren to obtain, for each of the set of children, a radius and an angle; and

using the radii and angles for the set of children to obtain a position displacement and an angle displacement between the parent and the particular element.

35.   (Previously Presented) A method as in claim 34, in which the particular element has a previous angle displacement, the method further comprising the step of comparing the obtained angle displacement with the previous angle displacement to determine whether to lay out children of the particular element.

36.   (Previously Presented) A method as in claim 30, in which the nearby node-link relationships include only relationships among the parent and the parent's children and grandchildren.

37.   (Previously Presented) A method as in claim 29, in which the method is performed in each of a series of iterations, each iteration comprising the steps of:

identifying elements to be laid out in the iteration;

performing the steps of obtaining and calculating for each of the identified elements; and

performing the step of storing for the identified elements.

38.   (Previously Presented) A method as in claim 37, in which the series of iterations is performed in response to an event requesting an insertion or deletion, the identified elements including elements affected by the insertion or deletion.

39.   (Previously Presented) A method as in claim 38, further comprising, before the series of iterations, the step of obtaining a weight for each iteration,

each iteration comprising using the weight in performing the step of calculating each element's position in the space with negative curvature.

40.   (Previously Presented) A method as in claim 37, in which the identified elements include elements added to the structure during a preceding iteration.

41.   (Previously Presented) A method as in claim 29, in which the space with negative curvature is a hyperbolic plane.

42.   (Previously Presented) A system comprising:

a processor for laying out a plurality of elements of a node-link structure in a space with negative curvature, the processor, in laying out the node-link structure:

obtaining nearby relationship data for each element n the plurality, the nearby relationship data indicating information about nearby node-link relationships;

based on the nearby relationship data for each element in the plurality, calculating element's position in the space with negative curvature; and

storing the positions for each element in the plurality in a data structure such that after the positions for all elements in the plurality have been calculated, the position of each element in

the plurality is stored in the data structure only relative to an element of the node-link structure other than a root element of the node-link structure.

      43.   (Previously Presented) An article of manufacture for use in a system that includes a storage medium access device and a processor connected for receiving data accessed on a storage medium by the storage medium access device, the article of manufacture comprising:

       a storage medium; and

       instruction data stored by the storage medium, the instruction data indicating instructions the processor can execute, the processor, in executing the instructions, laying out a plurality of elements of a node-link structure in a space with negative curvature, the processor, in laying out the plurality of elements:

       obtaining nearby relationship data for each element in the plurality, the nearby relationship data indicating information about nearby node-link relationships;

       based on the nearby relationship data for each element in the plurality, calculating element's position in the space with negative curvature; and

       storing the positions for each element in the plurality in a data structure such that after the positions for all elements in the plurality have been calculated, the position of each element in the plurality is stored in the data structure only relative to an element of the node-link structure other than a root element of the node-link structure.

      44.   (Previously Presented) A method of transferring data between first and second machines over a network, the second machine including memory and a processor connected for accessing the memory, the memory being for storing instruction data, the method comprising the steps of:

       establishing a connection between the first and second machines over the network; and

operating the first and second machines to transfer instruction data from the first machine to the memory of the second machine, the instruction data indicating instructions the processor can execute, the processor, in executing the instructions, laying out a plurality of elements of a node-link structure in a space with negative curvature, the processor, in laying out the plurality of elements:

obtaining nearby relationship data for each element in the plurality, the nearby relationship data indicating information about nearby node-link relationships;

based on the nearby relationship data for each element in the plurality, calculating element's position in the space with negative curvature; and

storing the positions for each element in the plurality in a data structure such that after the positions for all elements in the plurality have been calculated, the position of each element in the plurality is stored in the data structure only relative to an element of the node-link structure other than a root element of the node-link structure.

X.   EVIDENCE APPENDIX

REFERENCE	WHERE ENTERED IN RECORD	Exhibit
"Space Properties", pp. 1-6 (2002), available at http://scholar.uwinnipeg.ca/courses/38/4500.6-001/Cosmology/Properties_of Space.pdf, visited 6/4/2004	Copy attached to Response E, filed July 13, 2004	1
Anderson, James W., "Hyperbolic Geometry," Springer-Verlag London Limited, Great Britain, 1999, title page, copyright page, and pp. 1-7	IDS submitted April 6, 2005	2
U.S. Patent No. 5,619,632	IDS submitted November 12. 1999	3
U.S. Patent No. 5,590,250	IDS submitted November 12, 1999	4

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